

SEQUENCE LISTING

<110> Rondon, Isaac J  
Ladner, Robert C

<120> BINDING PEPTIDES FOR CARCINOEMBRYONIC ANTIGEN (CEA)

<130> Sequence Listing DYX-016.1 US

<140> (not yet assigned)

<141> 2001-04-03

<150> US 09/541345

<151> 2000-04-03

<160> 151

<170> PatentIn Ver. 2.1

<210> 1

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<220>

<221> VARIANT

<222> (1)

<223> Xaa is Asn, Asp or is absent

<220>

<221> VARIANT

<222> (2)

<223> Xaa is Trp

<220>

<221> VARIANT

<222> (3)

<223> Xaa is Asp, Phe or Val

<220>

<221> VARIANT

<222> (5)

<223> Xaa is Asn, Glu or Met

<220>  
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 <222> (6)  
 <223> Xaa is Asn, Leu, Met or Phe

<220>  
 <221> VARIANT  
 <222> (7)  
 <223> Xaa is Asp, Gly, Ile, Lys, Phe or Thr

<220>  
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 <223> Xaa is Ala, Gln, gly Lys or Thr

<220>  
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 <222> (9)  
 <223> Xaa is Arg, Asn, Asp, Glu or Gly

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 <222> (10)  
 <223> Xaa is Gln, Leu or Gly

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 <223> Xaa is Ala, Trp or Tyr

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 <223> Xaa is Ala, Gly, His, Phe, Thr or Val

<220>  
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 <222> (14)  
 <223> Xaa is Asn, Gln, Phe, Ser or Val

<220>  
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 <222> (15)  
 <223> Xaa is Arg, Leu Pro or Ser

<220>  
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 <222> (16)

<223> Xaa is Leu, Ser, Trp or Tyr

<400> 1

Xaa Xaa Xaa Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Xaa Xaa  
1 5 10 15

<210> 2

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: family of  
preferred CEA binding moieties

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<223> Xaa is Asn or Asp

<220>

<221> VARIANT

<222> (6)

<223> Xaa is Ph, Met, Leu or Asn

<220>

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<222> (7)

<223> Xaa is Asp, Gly, Ile, Lys, Phe or Thr

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<221> VARIANT

<222> (9)

<223> Xaa is Arg, Asn, Asp, Glu, Gly or Trp

<220>

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<222> (12)

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<221> VARIANT

<222> (15)

<223> Xaa is Arg, Leu, Pro or Ser

<220>

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<222> (16)

<223> Xaa is Leu, Ser, Trp or Tyr

<400> 2

Xaa Trp Val Cys Glu Xaa Xaa Lys Xaa Gln Trp Xaa Cys Asn Xaa Xaa  
1 5 10 15

<210> 3

<211> 10

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
loop

<220>

<221> VARIANT

<222> (2)

<223> Xaa is Asn, Glu or Met

<220>

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<222> (3)

<223> Xaa is Asn, Leu, Met or Phe

<220>

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<222> (4)

<223> Xaa is Asp, Gly, Ile, Lys, Phe or Thr

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<220>

<221> VARIANT

<222> (9)

<223> Xaa is Ala, Gly, His, Phe, Thr or Val

<400> 3

Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys

1

5

10

<210> 4

<211> 16

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<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 4

Asn Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asn Ser Tyr

1

5

10

15

<210> 5

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 5

Asp Trp Val Cys Glu Asn Lys Lys Asp Gln Trp Thr Cys Asn Leu Leu

1

5

10

15

<210> 6

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 6

Asn Trp Asp Cys Met Phe Gly Ala Glu Gly Trp Ala Cys Ser Pro Trp  
1 5 10 15

<210> 7

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 7

Asp Trp Val Cys Glu Lys Thr Thr Gly Gly Tyr Val Cys Gln Pro Leu  
1 5 10 15

<210> 8

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 8

Asn Trp Phe Cys Glu Met Ile Gly Arg Gln Trp Gly Cys Val Pro Ser  
1 5 10 15

<210> 9

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 9

Asp Trp Val Cys Asn Phe Asp Gln Gly Leu Ala His Cys Phe Pro Ser  
1 5 10 15

<210> 10  
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 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: parental  
 domain for design of microprotein display library

<220>  
 <221> VARIANT  
 <222> (1)..(12)  
 <223> amino acid positions 4 and 9 are invariant Cys;  
 all other positions Xaa are varied but not Cys, to  
 provide a library of 2x10(8) different peptides  
 based on the template sequence

<400> 10  
 Xaa Xaa Xaa Cys Xaa Xaa Xaa Xaa Cys Xaa Xaa Xaa  
 1 5 10

<210> 11  
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 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: parental  
 domain for design of microprotein display library

<220>  
 <221> VARIANT  
 <222> (1)..(11)  
 <223> amino acid positions 3 and 9 are invariant Cys;  
 all other positions Xaa are varied but not Cys, to  
 provide a library of 1x10(9) different peptides  
 based on the template sequence

<400> 11  
 Xaa Xaa Cys Xaa Xaa Xaa Xaa Xaa Cys Xaa Xaa  
 1 5 10

<210> 12  
 <211> 12

<212> PRT  
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: parental  
domain for design of microprotein display library

<220>

<221> VARIANT

<222> (1)..(12)

<223> amino acid positions 3 and 10 are invariant Cys;  
all other positions Xaa are varied but not Cys, to  
provide a library of  $1 \times 10^9$  different peptides  
based on the template sequence

<400> 12

Xaa	Xaa	Cys	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Cys	Xaa	Xaa
1				5					10		

<210> 13

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: parental  
domain for design of microprotein display library

<220>

<221> VARIANT

<222> (1)..(16)

<223> amino acid positions 4 and 13 are invariant Cys;  
all other positions Xaa are varied but not Cys, to  
provide a library of  $2.5 \times 10^8$  different peptides  
based on the template sequence

<400> 13

Xaa	Xaa	Xaa	Cys	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Cys	Xaa	Xaa	Xaa
1				5				10				15		

<210> 14

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<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: variable  
sublibrary sequence used in designing focused  
secondary library

<220>

<221> VARIANT

<222> (1)..(3)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (5)..(6)

<223> Xaa is any amino acid except Cys

<400> 14

Xaa	Xaa	Xaa	Cys	Xaa	Xaa	Lys	Lys	Asp	Gln	Trp	Thr	Cys	Asn	Leu	Leu
1				5					10					15	

<210> 15

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: variable  
sublibrary sequence used in designing focused  
secondary library

<220>

<221> VARIANT

<222> (5)..(9)

<223> Xaa is any amino acid except Cys

<400> 15

Asp	Trp	Val	Cys	Xaa	Xaa	Xaa	Xaa	Xaa	Gln	Trp	Thr	Cys	Asn	Leu	Leu
1				5					10					15	

<210> 16

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: variable  
sublibrary sequence used in designing focused  
secondary library

<220>

<221> VARIANT

<222> (8)..(12)

<223> Xaa is any amino acid except Cys

<400> 16

Asp	Trp	Val	Cys	Glu	Asn	Lys	Xaa	Xaa	Xaa	Xaa	Xaa	Cys	Asn	Leu	Leu
1				5					10					15	

<210> 17

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<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: variable  
sublibrary sequence used in designing focused  
secondary library

<220>

<221> VARIANT

<222> (11)..(12)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (14)..(16)

<223> Xaa is any amino acid except Cys

<400> 17

Asp	Trp	Val	Cys	Glu	Asn	Lys	Lys	Asp	Gln	Xaa	Xaa	Cys	Xaa	Xaa	Xaa
1				5					10					15	

<210> 18

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: variable  
sublibrary sequence used in designing focused  
secondary library

<220>

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<222> (6)..(7)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (9)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (12)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (15)

<223> Xaa is any amino acid except Cys

<400> 18

Asp	Trp	Val	Cys	Glu	Xaa	Xaa	Lys	Xaa	Gln	Trp	Xaa	Cys	Asn	Xaa	Leu
1				5					10					15	

<210> 19

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: variable  
sublibrary sequence used in designing focused  
secondary library

<220>

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<222> (5)..(7)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (9)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (12)

<223> Xaa is any amino acid except Cys

<400> 19

Asn Trp Val Cys Xaa Xaa Xaa Lys Xaa Gln Trp Xaa Cys Asn Ser Tyr  
1 5 10 15

<210> 20

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: variable  
sublibrary sequence used in designing focused  
secondary library

<220>

<221> VARIANT

<222> (1)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (3)

<223> Xaa is any amino acid except Cys

<220>

<221> VARIANT

<222> (14)..(16)

<223> Xaa is any amino acid except Cys

<400> 20

Xaa Trp Xaa Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Xaa Xaa Xaa  
1 5 10 15

<210> 21

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: isolate of  
TN10/9 library found not to bind CEA

<400> 21

Asn Trp Arg Cys Lys Leu Phe Pro Arg Tyr Pro Tyr Cys Ser Ser Trp  
1 5 10 15

<210> 22  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: isolate of  
 TN10/9 library found not to bind CEA

<400> 22  
 Arg Tyr Cys Glu Phe Phe Pro Trp Ser Leu His Cys Gly Arg Pro  
 1 5 10 15

<210> 23  
 <211> 16  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: conserved  
 amino acid positions in first family of CEA  
 binding peptides

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 <222> (6)  
 <223> X is Asn, Leu, Met or Phe

<220>  
 <221> VARIANT  
 <222> (7)  
 <223> X is Asp, Gly, Ile, Lys, Phe or Thr

<220>  
 <221> VARIANT  
 <222> (9)  
 <223> X is Arg, Asn, Asp, Glu or Gly

<220>  
 <221> VARIANT  
 <222> (12)  
 <223> X is Ala, Gly, His, Phe, Thr or Val

<220>  
 <221> VARIANT  
 <222> (15)

<223> X is Arg, Leu, Pro or Ser

<400> 23

Asp Trp Val Cys Glu Xaa Xaa Lys Xaa Gln Trp Xaa Cys Asn Xaa Leu  
1 5 10 15

<210> 24

<211> 27

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic CEA  
binding peptide with C-terminal immobilization  
sequence

<400> 24

Ser Asn Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asn Ser  
1 5 10 15

Tyr Ala Pro Gly Gly Glu Gly Gly Gly Ser Lys  
20 25

<210> 25

<211> 27

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic CEA  
binding peptide with C-terminal immobilization  
sequence

<400> 25

Ser Asp Trp Val Cys Glu Asn Lys Lys Asp Gln Trp Thr Cys Asn Leu  
1 5 10 15

Leu Ala Pro Gly Gly Glu Gly Gly Gly Ser Lys  
20 25

<210> 26

<211> 27

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic CEA  
binding peptide with C-terminal immobilization  
sequence

<400> 26

Ser Asn Trp Asp Cys Met Phe Gly Ala Glu Gly Trp Ala Cys Ser Pro  
1 5 10 15

Trp Ala Pro Gly Gly Glu Gly Gly Gly Ser Lys  
20 25

<210> 27

<211> 27

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic CEA  
binding peptide with C-terminal immobilization  
sequence

<400> 27

Ser Asp Trp Val Cys Glu Leu Thr Thr Gly Gly Tyr Val Cys Gln Pro  
1 5 10 15

Leu Ala Pro Gly Gly Glu Gly Gly Gly Ser Lys  
20 25

<210> 28

<211> 10

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: C-terminal  
sequence for immobilizing peptides

<400> 28

Ala Pro Gly Gly Glu Gly Gly Gly Ser Lys  
1 5 10

<210> 29

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: template  
sequence for sublibrary used in construction of  
focused secondary display library

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<222> (1)..(3)

<223> X is any amino acid except Cys

<220>

<221> VARIANT

<222> (5)..(6)

<223> X is any amino acid except Cys

<400> 29

Xaa	Xaa	Xaa	Cys	Xaa	Xaa	Lys	Lys	Asp	Gln	Trp	Thr	Cys	Asn	Leu	Leu
1				5					10					15	

<210> 30

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<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: template  
sequence for sublibrary used in construction of  
focused secondary display library

<220>

<221> VARIANT

<222> (5)..(9)

<223> X is any amino acid except Cys

<400> 30

Asp	Trp	Val	Cys	Xaa	Xaa	Xaa	Xaa	Xaa	Gln	Trp	Thr	Cys	Asn	Leu	Leu
1				5					10					15	

<210> 31

<211> 16

<212> PRT

<213> Artificial Sequence

<220>



<223> Description of Artificial Sequence: template  
sequence for sublibrary used in construction of  
focused secondary display library

<220>

<221> VARIANT

<222> (8)..(12)

<223> X is any amino acid except Cys

<400> 31

Asp	Trp	Val	Cys	Glu	Asn	Lys	Xaa	Xaa	Xaa	Xaa	Xaa	Cys	Asn	Leu	Leu
1				5					10					15	

<210> 32

<211> 16

<212> PRT

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<220>

<223> Description of Artificial Sequence: template  
sequence for sublibrary used in construction of  
focused secondary display library

<220>

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<222> (11)..(12)

<223> X is any amino acid except Cys

<220>

<221> VARIANT

<222> (14)..(16)

<223> X is any amino acid except Cys

<400> 32

Asp	Trp	Val	Cys	Glu	Asn	Lys	Lys	Asp	Gln	Xaa	Xaa	Cys	Xaa	Xaa	Xaa
1				5					10					15	

<210> 33

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: template  
sequence for sublibrary used in construction of  
focused secondary display library

<220>  
<221> VARIANT  
<222> (6)..(7)  
<223> X is any amino acid except Cys

<220>  
<221> VARIANT  
<222> (9)  
<223> X is any amino acid except Cys

<220>  
<221> VARIANT  
<222> (12)  
<223> X is any amino acid except Cys

<220>  
<221> VARIANT  
<222> (15)  
<223> X is any amino acid except Cys

<400> 33  
Asp Trp Val Cys Glu Xaa Xaa Lys Xaa Gln Trp Xaa Cys Asn Xaa Leu  
1 5 10 15

<210> 34  
<211> 16  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: template  
sequence for sublibrary used in construction of  
focused secondary display library

<220>  
<221> VARIANT  
<222> (5)..(7)  
<223> X is any amino acid except Cys

<220>  
<221> VARIANT  
<222> (9)  
<223> X is any amino acid except Cys

<220>  
<221> VARIANT

<222> (12)

<223> X is any amino acid except Cys

<400> 34

Asn	Trp	Val	Cys	Xaa	Xaa	Xaa	Lys	Xaa	Gln	Trp	Xaa	Cys	Asn	Ser	Tyr
1				5					10					15	

<210> 35

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: template  
sequence for sublibrary used in construction of  
focused secondary display library

<220>

<221> VARIANT

<222> (1)

<223> X is any amino acid except Cys

<220>

<221> VARIANT

<222> (3)

<223> X is any amino acid except Cys

<220>

<221> VARIANT

<222> (14)..(16)

<223> X is any amino acid except Cys

<400> 35

Xaa	Trp	Xaa	Cys	Asn	Leu	Phe	Lys	Asn	Gln	Trp	Phe	Cys	Xaa	Xaa	Xaa
1				5					10					15	

<210> 36

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: family of CEA  
binding polypeptides

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<221> VARIANT

<222> (1)

<223> Xaa is Asp, Asn, Ala or Ile

<220>

<221> VARIANT

<222> (3)

<223> Xaa is Val, Ile, Met, Tyr, Phe, Pro or Asp

<220>

<221> VARIANT

<222> (5)

<223> Xaa is Asn, Glu or Asp

<220>

<221> VARIANT

<222> (6)

<223> Xaa is Leu, Phe, Tyr, Trp, Val Met, Ile or Asn

<220>

<221> VARIANT

<222> (7)

<223> Xaa is Phe, Leu, Asp, Glu, Ala, Ile, Lys, Asn,  
Ser, Val, Trp or Tyr

<220>

<221> VARIANT

<222> (8)

<223> Xaa is Lys, Phe, Asp, Gly, Leu, Asn or Trp

<220>

<221> VARIANT

<222> (9)

<223> Xaa is Asn, Pro, Phe, Gly, Asp, Ala, Ser, Glu, Gln  
or Trp

<220>

<221> VARIANT

<222> (10)

<223> Xaa is Gln or Lys

<220>

<221> VARIANT

<222> (12)

<223> Xaa is Phe, Thr, Met, Ser, Ala, Asn, Val, His,  
Ile, Pro, Trp or Tyr

<220>

<221> VARIANT  
 <222> (14)  
 <223> Xaa is Asn, Asp, Glu, Pro, Gln or Ser

<220>  
 <221> VARIANT  
 <222> (15)  
 <223> Xaa is Val, Leu, Ile, Pro, Ala, Gln, Ser, Met,  
 Glu, Thr, Lys or Trp

<220>  
 <221> VARIANT  
 <222> (16)  
 <223> Xaa is Leu, Met, Val, Tyr, Ala, Ile, Trp, His,  
 Pro, Gln, Glu, Phe, Lys or Arg

<400> 36  
 Xaa Trp Xaa Cys Xaa Xaa Xaa Xaa Xaa Trp Xaa Cys Xaa Xaa Xaa  
 1 5 10 15

<210> 37  
 <211> 16  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: CEA binding  
 polypeptide

<400> 37  
 Asp Trp Met Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Leu Met  
 1 5 10 15

<210> 38  
 <211> 16  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: CEA binding  
 polypeptide

<400> 38  
 Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Leu Met  
 1 5 10 15

<210> 39  
<211> 16  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 39  
Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Gln Met  
1 5 10 15

<210> 40  
<211> 16  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 40  
Asn Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Gln Glu  
1 5 10 15

<210> 41  
<211> 16  
<212> PRT  
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<220>  
<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 41  
Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Gln Val Lys  
1 5 10 15

<210> 42  
<211> 16  
<212> PRT  
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 42

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Met  
1 5 10 15

<210> 43

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 43

Asp Trp Met Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Gln Ile  
1 5 10 15

<210> 44

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 44

Ile Trp Asp Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Pro Ala Pro  
1 5 10 15

<210> 45

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 45

Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Ile Arg

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&lt;210&gt; 46

&lt;211&gt; 16

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

<223> Description of Artificial Sequence: CEA binding  
polypeptide

&lt;400&gt; 46

Asp Trp Met Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Val

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&lt;210&gt; 47

&lt;211&gt; 16

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

<223> Description of Artificial Sequence: CEA binding  
polypeptide

&lt;400&gt; 47

Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Ala Ile

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&lt;210&gt; 48

&lt;211&gt; 16

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

<223> Description of Artificial Sequence: CEA binding  
polypeptide

&lt;400&gt; 48

Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Met Ala

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&lt;210&gt; 49

&lt;211&gt; 16

&lt;212&gt; PRT



<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 49

Asp	Trp	Val	Cys	Glu	Phe	Leu	Lys	Met	Gln	Trp	Ala	Cys	Asn	Val	Leu
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<210> 50

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 50

Asp	Trp	Val	Cys	Asn	Leu	Phe	Lys	Asn	Gln	Trp	Phe	Cys	Asn	Val	Met
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<210> 51

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 51

Ala	Trp	Pro	Cys	Asn	Leu	Phe	Lys	Asn	Gln	Trp	Phe	Cys	Pro	Pro	Gln
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<210> 52

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 52

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Leu  
1 5 10 15

<210> 53

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 53

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Lys Trp  
1 5 10 15

<210> 54

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 54

Asp Trp Val Cys Glu Trp Leu Lys Met Gln Trp Ala Cys Asn Met Leu  
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<210> 55

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 55

Asp Trp Val Cys Asp Phe Phe Phe Asn Gln Trp Thr Cys Asn Leu Leu  
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<210> 56

<211> 16  
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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 56

Asp	Trp	Val	Cys	Glu	Met	Phe	Lys	Ala	Gln	Trp	Phe	Cys	Asn	Ala	Leu
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<210> 57

<211> 16

<212> PRT

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polypeptide

<400> 57

Asp	Trp	Ile	Cys	Asn	Leu	Phe	Lys	Asn	Gln	Trp	Phe	Cys	Asp	Ala	Trp
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<210> 58

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 58

Asp	Trp	Val	Cys	Asn	Leu	Phe	Lys	Asn	Gln	Trp	Phe	Cys	Asp	Val	Trp
1				5					10					15	

<210> 59

<211> 16

<212> PRT

<213> Artificial Sequence

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polypeptide

<400> 59

Asp Trp Val Cys Glu Tyr Phe Lys Asn Gln Trp Phe Cys Asn Val Leu  
1 5 10 15

<210> 60

<211> 16

<212> PRT

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polypeptide

<400> 60

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<210> 61

<211> 16

<212> PRT

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polypeptide

<400> 61

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<210> 62

<211> 16

<212> PRT

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polypeptide

<400> 62

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Gln  
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<210> 63  
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<400> 63  
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1 5 10 15

<210> 64  
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<210> 65  
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<400> 66

Asn Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Thr Val  
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<210> 67

<211> 16

<212> PRT

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polypeptide

<400> 67

Asp Trp Val Cys Glu Phe Tyr Lys Ser Gln Trp Asn Cys Asn Ile Leu  
1 5 10 15

<210> 68

<211> 16

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polypeptide

<400> 68

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<210> 69

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 69

Asp Trp Tyr Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Leu

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&lt;210&gt; 70

&lt;211&gt; 16

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

<223> Description of Artificial Sequence: CEA binding  
polypeptide

&lt;400&gt; 70

Asp Trp Val Cys Glu Tyr Asn Asp Glu Gln Trp Thr Cys Asn Leu Leu  
1 5 10 15

&lt;210&gt; 71

&lt;211&gt; 16

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

<223> Description of Artificial Sequence: CEA binding  
polypeptide

&lt;400&gt; 71

Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asn Glu Ala  
1 5 10 15

&lt;210&gt; 72

&lt;211&gt; 16

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

<223> Description of Artificial Sequence: CEA binding  
polypeptide

&lt;400&gt; 72

Asp Trp Val Cys Asn Trp Glu Leu Phe Gln Trp Thr Cys Asn Leu Leu  
1 5 10 15

&lt;210&gt; 73

&lt;211&gt; 16

&lt;212&gt; PRT

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polypeptide

<400> 73

Asp	Trp	Val	Cys	Asn	Leu	Phe	Lys	Asn	Gln	Trp	Phe	Cys	Asp	Gln	Val
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<210> 74

<211> 16

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<400> 74

Asp	Trp	Val	Cys	Asn	Leu	Phe	Lys	Asn	Gln	Trp	Phe	Cys	Asp	Val	Pro
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<210> 75

<211> 16

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<400> 75

Asp	Trp	Val	Cys	Glu	Phe	Phe	Lys	Gln	Gln	Trp	Phe	Cys	Asn	Val	Leu
1				5					10					15	

<210> 76

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<400> 76

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1 5 10 15

<210> 77

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 77

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Ser Leu  
1 5 10 15

<210> 78

<211> 16

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 78

Asp Trp Val Cys Glu Phe Met Lys His Gln Trp Phe Cys Asn Pro Leu  
1 5 10 15

<210> 79

<211> 16

<212> PRT

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polypeptide

<400> 79

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1 5 10 15

<210> 80

<211> 16  
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<210> 82  
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<400> 82  
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1 5 10 15

<210> 83  
<211> 16  
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polypeptide

<400> 83

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Thr Leu  
1 5 10 15

<210> 84

<211> 16

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<400> 84

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<210> 85

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: CEA binding  
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<400> 85

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<210> 86

<211> 16

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<223> Description of Artificial Sequence: CEA binding  
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<400> 86

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<210> 87  
<211> 16  
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polypeptide

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<210> 88  
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<400> 90

Asp Trp Val Cys Asn Trp Leu Trp Gly Gln Trp Thr Cys Asn Leu Leu  
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<210> 91

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: CEA binding  
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<400> 91

Asp Trp Val Cys Glu Met Phe Lys Lys Gln Trp Val Cys Asn Pro Leu  
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<210> 92

<211> 16

<212> PRT

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<210> 93

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 93

Asp Trp Val Cys Glu Val Ile Lys Asp Gln Trp Val Cys Asn Pro Leu

1 5 10 15

<210> 94  
<211> 16  
<212> PRT  
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polypeptide

<400> 94  
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1 5 10 15

<210> 95  
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polypeptide

<400> 95  
Asp Trp Val Cys Glu Tyr Ala Lys Asn Gln Trp Asn Cys Asn Pro Leu  
1 5 10 15

<210> 96  
<211> 16  
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polypeptide

<400> 96  
Asn Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Glu Trp Ala  
1 5 10 15

<210> 97  
<211> 16  
<212> PRT

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 97

Asn	Trp	Val	Cys	Asp	Tyr	Trp	Lys	Pro	Gln	Trp	Phe	Cys	Asn	Ser	Tyr
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<210> 98

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 98

Asp	Trp	Tyr	Cys	Asn	Leu	Phe	Lys	Asn	Gln	Trp	Phe	Cys	Asp	Leu	Val
1				5					10					15	

<210> 99

<211> 16

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 99

Asn	Trp	Val	Cys	Asn	Leu	Phe	Lys	Asn	Gln	Trp	Phe	Cys	Asp	Glu	Met
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<210> 100

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 100

Asp Trp Val Cys Glu Leu Phe Lys Pro Gln Trp Phe Cys Asn Ile Leu  
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<210> 101

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 101

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1 5 10 15

<210> 102

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 102

Asp Trp Val Cys Asp Tyr Lys Phe Phe Gln Trp Thr Cys Asn Leu Leu  
1 5 10 15

<210> 103

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 103

Asn Trp Val Cys Glu Trp Leu Lys Pro Gln Trp Trp Cys Asn Ser Tyr  
1 5 10 15

<210> 104



<211> 16  
<212> PRT  
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<223> Description of Artificial Sequence: CEA binding  
polypeptide

<400> 104  
Asp Trp Val Cys Glu Phe Phe Lys Pro Gln Trp Met Cys Asn Ile Leu  
1 5 10 15

<210> 105  
<211> 16  
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polypeptide

<400> 105  
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1 5 10 15

<210> 106  
<211> 16  
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polypeptide

<400> 106  
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1 5 10 15

<210> 107  
<211> 16  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: CEA binding

# polypeptide

<400> 107

Asp Trp Val Cys Glu Tyr Ala Lys Phe Gln Trp Ile Cys Asn Ile Leu  
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<210> 108

<211> 16

<212> PRT

<213> Artificial Sequence

<400> 108

Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asn Glu Ala  
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<210> 109

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic  
 16-mer microprotein analogues

<400> 109

Asp Trp Val Cys Glu Tyr Phe Lys Asn Gln Trp Phe Cys Asp Thr Leu  
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<210> 110

<211> 10

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<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic  
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Val, Trp, Tyr, Gly or Thr

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Trp, His, Arg, Met, Val or Leu

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<222> (9)

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Pro, Trp, Tyr, Gly, Leu or Glu

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<210> 111

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16-mer microprotein analogues

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<223> X is Val, Ile, Met, Tyr, Phe, Pro or Asp

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Val, Trp, Tyr, Gly, or Thr

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or Thr

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Trp, His, Arg, Met, Val, or Leu

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Pro, Trp, Tyr, Gly, Leu or Glu

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Thr, Lys, Trp or Arg

<220>

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<222> (16)

<223> X is Leu, Met, Val, Tyr, Ala, Ile, Trp, His, Pro,  
Gln, Glu, Phe, Lys, Arg or Ser

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<210> 112

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

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<210> 113  
<211> 16  
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16-mer microprotein analogues

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<210> 114  
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16-mer microprotein analogues

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<210> 115  
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16-mer microprotein analogues

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1 5 10 15

<210> 116  
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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 116

Asp Trp Val Cys Glu Ile Val Lys Asn Gln Trp His Cys Asn Val Leu  
1 5 10 15

<210> 117

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 117

Asp Trp Val Cys Glu Trp Gly Lys Asn Gln Trp Thr Cys Asn Pro Leu  
1 5 10 15

<210> 118

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 118

Asp Trp Val Cys Glu Phe Glu Lys Gly Gln Trp Thr Cys Asn Val Leu  
1 5 10 15

<210> 119

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 119

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asn Val Trp

1 5 10 15

<210> 120  
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 16-mer microprotein analogues

<400> 120  
 Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val His  
 1 5 10 15

<210> 121  
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 <212> PRT  
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 16-mer microprotein analogues

<400> 121  
 Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Ile Arg  
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<210> 122  
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 <212> PRT  
 <213> Artificial Sequence

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 16-mer microprotein analogues

<400> 122  
 Asp Trp Val Cys Glu Trp Leu Lys Met Gln Trp Ala Cys Asn Ile Leu  
 1 5 10 15

<210> 123  
 <211> 16  
 <212> PRT



<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 123

Asp	Trp	Val	Cys	Glu	Phe	Ile	Lys	Asp	Gln	Trp	Tyr	Cys	Asp	Leu	Ala
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<210> 124

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 124

Asp	Trp	Val	Cys	Asn	Leu	Phe	Lys	Asn	Gln	Trp	Phe	Cys	Asp	Val	Val
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<210> 125

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 125

Asp	Trp	Val	Cys	Glu	Trp	Leu	Lys	Met	Gln	Trp	Ala	Cys	Asn	Val	Leu
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<210> 126

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 126

Asp Trp Val Cys Glu Trp Leu Lys Asn Gln Trp Trp Cys Asn Val Leu  
1 5 10 15

<210> 127

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 127

Asp Trp Val Cys Glu Leu Leu Lys Asn Gln Trp Phe Cys Asn Val Leu  
1 5 10 15

<210> 128

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 128

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asn Val Leu  
1 5 10 15

<210> 129

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 129

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Val Met  
1 5 10 15

<210> 130

<211> 16  
<212> PRT  
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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 130

Asp	Trp	Val	Cys	Glu	Trp	Phe	Lys	Ala	Gln	Trp	Phe	Cys	Asn	Met	Leu
1				5					10					15	

<210> 131

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 131

Asp	Trp	Ile	Cys	Asn	Leu	Phe	Lys	Asn	Gln	Trp	Phe	Cys	Asp	Gln	Leu
1				5					10					15	

<210> 132

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 132

Asp	Trp	Met	Cys	Asn	Leu	Phe	Lys	Asn	Gln	Trp	Phe	Cys	Asp	Val	Gln
1				5					10					15	

<210> 133

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic

16-mer microprotein analogues

<400> 133

Asp Trp Val Cys Glu Phe Asp Lys Gly Gln Trp Asn Cys Asn Ile Leu  
1 5 10 15

<210> 134

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 134

Asp Trp Ile Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Ala Trp  
1 5 10 15

<210> 135

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 135

Asp Trp Val Cys Glu Phe Asp Lys Leu Gln Trp Val Cys Asn Val Leu  
1 5 10 15

<210> 136

<211> 16

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<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 136

Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Gln Met  
1 5 10 15

<210> 137

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 137

Asp	Trp	Val	Cys	Glu	Phe	Phe	Lys	Ser	Gln	Trp	Tyr	Cys	Asn	Ile	Leu
1					5					10					15

<210> 138

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 138

Asp	Trp	Val	Cys	Glu	Trp	Leu	Lys	Met	Gln	Trp	Ala	Cys	Asn	Met	Leu
1					5					10					15

<210> 139

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 139

Asp	Trp	Val	Cys	Glu	Tyr	Phe	Lys	Asn	Gln	Trp	Leu	Cys	Asn	Ile	Leu
1					5					10					15

<210> 140

<211> 16

<212> PRT

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 140

Asp Trp Val Cys Glu Trp Leu Lys Met Gln Trp Ala Cys Asn Ile Leu  
1 5 10 15

<210> 141

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 141

Asp Trp Val Cys Glu Trp Leu Lys Met Gln Trp Phe Cys Asn Ala Leu  
1 5 10 15

<210> 142

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 142

Asp Trp Val Cys Glu Trp Leu Lys Met Gln Trp Ala Cys Asn Val Leu  
1 5 10 15

<210> 143

<211> 16

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 143

Asp Trp Val Cys Glu Trp Leu Lys Met Gln Trp Ala Cys Asn Met Leu

1 5 10 15

<210> 144  
 <211> 16  
 <212> PRT  
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<220>  
 <223> Description of Artificial Sequence: synthetic  
 16-mer microprotein analogues

<400> 144  
 Asp Trp Val Cys Glu Trp Leu Lys Pro Gln Trp Tyr Cys Asn Ser Leu  
 1 5 10 15

<210> 145  
 <211> 16  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetic  
 16-mer microprotein analogues

<400> 145  
 Asp Trp Val Cys Asn Leu Phe Lys Asn Gln Trp Phe Cys Asp Leu Ser  
 1 5 10 15

<210> 146  
 <211> 16  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: synthetic  
 16-mer microprotein analogues

<400> 146  
 Asp Trp Val Cys Glu Trp Leu Lys Ser Gln Trp Phe Cys Asn Ser Leu  
 1 5 10 15

<210> 147  
 <211> 16  
 <212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 147

Asp	Trp	Val	Cys	Glu	Phe	Ile	Lys	Ser	Gln	Trp	Phe	Cys	Asn	Val	Leu
1				5					10					15	

<210> 148

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 148

Asp	Trp	Val	Cys	Glu	Trp	Leu	Lys	His	Gln	Trp	Phe	Cys	Asn	Ala	Leu
1				5					10					15	

<210> 149

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 149

Asp	Trp	Val	Cys	Glu	Ile	Val	Lys	Asn	Gln	Trp	Ile	Cys	Asn	Pro	Leu
1				5					10					15	

<210> 150

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues



<400> 150

Asp Trp Val Cys Glu Phe Phe Lys Asp Gln Trp Phe Cys Asn Ile Leu  
1 5 10 15

<210> 151

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
16-mer microprotein analogues

<400> 151

Asp Trp Val Cys Glu Phe Leu Lys Met Gln Trp Ala Cys Asn Val Leu  
1 5 10 15